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Development of community mathematics management model in Sangihe district

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Abstract
Mathematics learning comes from people's knowledge which is the basis for developing critical thinking skills because it is connected to students' prior knowledge and experience. The community mathematics exploration learning model facilitates students in learning activities to think critically in constructing early experiences and having democratic interstices. This study develops learning management about community mathematics. The mathematics learning management model is targeted to be a reference for the formulation and implementation of an interactive role design for the implementing components of learning. This research was conducted in 2018 to 2019. The research location was in the district. Manganitu, in this case Junior High School N 1 Manganitu and the district. Tabukan Utara Junior High School Kr. Bellae, Sangihe District, North Sulawesi Province. Based on the results of the study, the study group consisting of students and parents / community recommends a learning design for the exploration of community mathematical knowledge with a management component and its interactive role for mathematics learning that comes from community knowledge.

Keywords: mathematics, management model, Sangihe

Introduction

Social life is changing rapidly due to the process of globalization, democratization, and advances in science and technology, especially information technology. The development of globalization that penetrates all countries will certainly lead to changes or developments in the curriculum that applies to the world of education. The curriculum as a guide for the implementation of learning activities provides deep meaning between educators and students in the teaching and learning process. The curriculum as an activity includes a learning process that takes place in the classroom, laboratory, workshops, and in the field which is carried out in schools and outside of school (Teguh, 2015) [1].

Schools are educational facilities that are directly used to support the educational process. Teachers in teaching are still oriented in textbooks, and rarely connect with students' daily lives. Teachers have an important role in students' mathematics development (Cobb *et al*, 2002) [2].

Environmental conditions, where the soil structure is prone to causing landslides and floods everywhere. Therefore, the mathematical basis of society which deals with themes that are in touch with the environment is something very positive and useful to be felt. Mathematics and culture are two interrelated things that can be used to explain the role of mathematics in society. It can be said that culture acts as a direction giver to think, feel and act on these community groups. Thus the local culture in the existing community can play a role in carrying out organizational functions such as leadership functions, and human resources that can shape and influence human behavior. The mathematical knowledge of society is transformed intentionally or unintentionally. Mathematical logic such as asserting that something is bigger than another tends to transform accidentally. It can be concluded that students need a formal process to construct the experiences they already have with new experiences obtained from the surrounding environment or the local or external environment. The formal construction process should clarify previous experiences and knowledge, reinforce large experiences and reconstruct experiences that are theoretically or conceptually distorted (misconceptions). In fact, the learning process experienced by students since they attend formal education in Elementary Schools to Senior High Schools and even colleges is very limited or does not integrate personal experiences gained from the surrounding environment or from everyday life with classroom learning.

The arrangement of the curriculum systematically and systematically of mathematical concepts is very supportive for the construction process of students' mathematical experiences. The formal process of building mathematical knowledge that is integrated between experiences from the surrounding environment and everyday life needs to be developed systematically in stages according to the level of a child's thinking development.

Starting with a discussion of experiences (students with parents and groups of students) about natural phenomena, identification and inventory of problems, followed by concept discussions, analysis and interpretation of the relationship between experience and conceptual knowledge, and follow-up observations. /Measurements in the field to strengthen the results of the relationship analysis. Concepts with facts and phenomena and practicing procedural knowledge (Medellu, 2014) [3]. Learning activities in this study involve the role of parents and society in the student learning process. This can increase the motivation of students (individuals or groups) to learn from the community and its application in the context or themes about the environment. Community knowledge includes components of knowledge and culture of society that are related to one another (Moll, *et al* Amanti, and González, 2005) [4]. This will provide feedback in the development of a reliable management model in building democratic learning based on themes and learning materials from the

surrounding environment.

Hamalik (2010) [5] states that in order to achieve learning objectives, learning requires a well-structured bond which includes human elements, materials, facilities, equipment and procedures. Learning as a process of interaction between students and educators and learning resources in a learning environment. Based on the above understanding, it can be said that learning is an effort to condition students in learning through learning design in order to achieve optimal learning behavior. To achieve the quality of learning, management is needed. Management is an activity carried out to achieve predetermined goals by using humans and other resources. This management includes a process that is closely related to the implementation of learning management as an activity to achieve goals in an effort to improve the quality of learning.

The importance of management is here, so that the implementation of learning activities can be controlled so as to achieve the expected goals.

Exploration of mathematics learning in this study is a condition created by educators to encourage students in groups to discover something new by integrating the knowledge and experiences they have from the surrounding environment (context: facts, phenomena) with the knowledge (conceptual) obtained in school.

The results of these studies prove that learning mathematics can be interesting if students are faced with facts in the environment. This result is in line with what Boaler (2008) [6] states that students want mathematics learning that is connected to the environment in which they are located.

Conceptual Framework

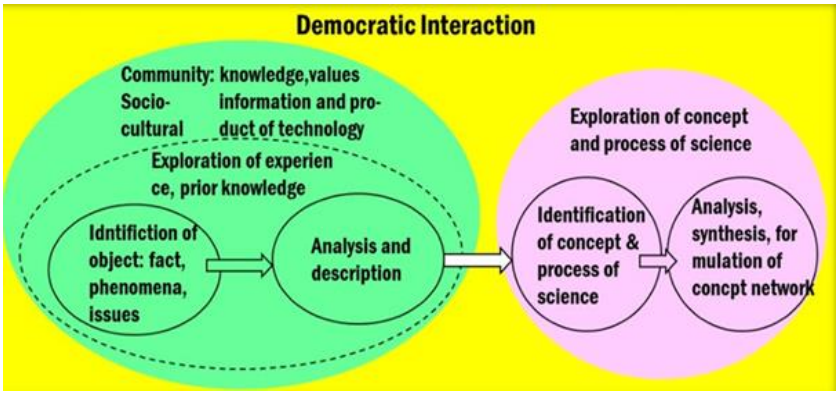
Management is the process of planning, organizing, leading and controlling an organization so that organizational goals can be achieved effectively and efficiently. The meaning of management is often interpreted as knowledge, tips and professionals. The achievement of organizational goals is carried out by managing the planning, organizing, mobilizing and controlling functions. Without management, an implementation of an activity or program will not only impact the difficulty of achieving the objectives set based on the usefulness of these resources. Learning is an activity designed for learning. Combined learning which consists of human elements, equipment, and procedures that greatly affect learning objectives. From the above understanding it can be said that learning as a system or student learning process in a learning environment that is planned systematically to achieve learning objectives effectively and efficiently. The Mathematics Learning Behavior Management Model is a representative of the actual situation of the mathematics subject area which will affect individual behavior to reduce the negative effect on mathematics learning. This learning management function can be described more specifically for learning in class or outside the classroom. The democratic learning philosophy emphasizes the objectives and learning process on strengthening or reconstructing individual experiences, so that learning must diversify to be able to accommodate differences in individual initial experiences to be built through collective learning activities. The principles of mathematical pedagogy put forward by (Anthony and Walshaw. 2009) [7] are important for socio-cultural aspects in mathematics learning. This is related to several reasons, including: children's experiences of thinking patterns that grow and are influenced by the socio-cultural elements of society, the need to understand the surrounding environment related to mathematical concepts and procedures, actual problem solving challenges through mathematical approaches, formal or formal learning interactions. As a student initiative in building knowledge and application of mathematical knowledge. Exploration of public knowledge and optimization of mathematical concepts and procedures based on this knowledge are important to provide strengthening knowledge while increasing student attention to mathematics.

Classical mathematical knowledge has deep roots in society (Apple, 2004) [8], and is a cultural strength and capital for students' critical attitudes and curiosity to learn. A critical attitude that is driven from knowledge and curiosity to further understand natural and socio-cultural phenomena in society must be responded positively through formal education in schools. Teachers must develop knowledge about social movements, history, culture, local and global socio-political forces that affect students (Gutstein, 2006) [9]. Group activity-based learning has strong potential for communication and exchange of ideas and experiences that reinforce each other to build shared knowledge. Grouping or student learning partners are arranged not only to be interested in learning materials but also to exchange ideas, thus encouraging higher degrees of thinking activities (Ding *et al*, 2007) [10]. Teachers have an important role in developing students' mathematical identities (Cobb and Hodge, 2002) [11]. The teacher can help students make careful connections about solution strategies where mathematical ideas are key (Watson and Mason, 2006) [12]. Assigning tasks related to experiential learning enables students to develop basic thinking about the importance of mathematical concepts and relationships; in this case the teacher can help students develop ways so that students can learn mathematics (Ainley, Pratt, & Hansen, 2006)[13]. Building relationships between mathematical concepts (and the concepts of other fields of study) is important to comprehensively understand thematic problems related to the physical and socio-cultural environment of society.

Method

Combined research methods (mix methods) is a research method that combines quantitative methods and qualitative methods. Combined method steps depart from the mixed methods study to be used. It was found that the focus of the problem was formulated in the formulation of the problem then used the theoretical basis to find theories related to the research context, collect data, analyze data qualitatively and quantitatively. (Sugiyono, 2016) [14]. Sources of data in this study are grouped into two groups, namely primary data and secondary data. Primary data were obtained from the community, students, teachers, parents, school leaders. Secondary data are websites, books, articles and other documents in the form of photos. This research was conducted in 2018 to 2019. The research location was in the district. Manganitu, in this case Junior High School N 1 Manganitu and Tabukan Utara District Junior High School Kr. Bellae, Sangihe District, North Sulawesi Province. The stages of learning research and learning management are carried out in two stages, the first stage in 2018, and the second stage in 2019. The type of research used is exploratory research that explores objects or information or research substances that have not been clearly revealed,

namely learning objects or themes, exploration of learning methods, exploration of democratic learning interactions, exploration of learning management. Methods of data collection and analysis using the TED learning model and development of management components. Learning management follows the needs of democratic thematic learning Activities (stages 1, 2, 3), but at the same time becomes a frame in the implementation of the learning design. Figure-3.1. shows Learning management to frame the thematic-explorative-democratic learning process. Learning management is developed following the management stages: planning, organizing, actuating, and controlling.



Source: Medellu and Silangen, 2019 [15]

Fig 1: TED learning model, type b

Results and Discussion

The design of learning management is part of the research results because this research is an exploratory research, including exploring learning management as a process to produce a formulation (Thematic-Explorative-Democratic - TED learning model) in the field of community mathematics learning. Exploration of learning management, including exploration of the components of implementing learning and their interactive roles. The role of the management component is evaluated together with the implementation of activities including the phase-1 and phase-2 TED activities. Phase-1 TED activities include: preparation, implementation of field activities, preparation of draft group reports, preparation of products or exploration results. TED activity phase-2 is discussion of draft reports and exploration products including discussions in groups and discussions across groups. The results of the evaluation serve as a reference for determining whether or not this role should be continued in the second year of research. The component groups of partner students who act as mentors are not analyzed and evaluated for their interactions with components other than the target student group. This is intended to analyze the needs of the learning management role by each component and its needs by other components. Figure-4.1 shows six interactive pathways between TED learning components and community mathematics objects. Study groups consisting of students (junior high schools) with parents and the community are central to the implementation of the management component (pathways 1, 2, and 3).

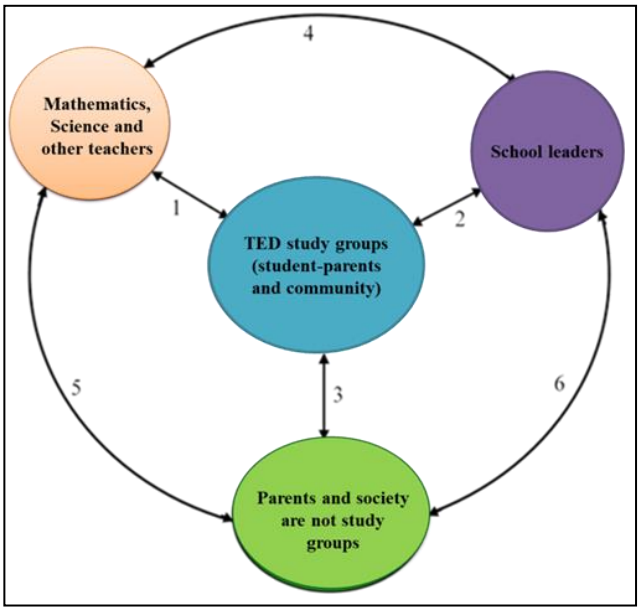


Fig 2: The TED learning management model of community mathematics

TED learning with community mathematics objects or themes is a solution to the problem of integrating learning experiences from outside of school with mathematics learning in schools. The process of conceptualizing and

formulating systemically procedural mathematical objects of society designed as an exploration stage in TED learning is a process of reconstructing basic knowledge into new experiences that are broader and more complex. The results showed that the study group consisting of junior high school students, parents and community members experienced difficulties or obstacles in the concept exploration stage (context conceptualization) and the formulation of systemic mathematical procedures. This shows that if TED learning about community mathematics is designed in the form of study groups: students-parents and the community are implemented continuously, this will improve: (1) the communication between children and parents about what they learn and the relationship between facts or phenomena. or issues in everyday life, (2) raising children's learning initiatives with parents and supported by communities who have knowledge and experience about the substance of learning, (3) collaborative learning for learning at school or increasing learning activities outside the classroom, (4) building positive perceptions and appreciation of students towards parents and society. This is an increase in the democratization of learning, the formation of democratic attitudes and behavior of students. These results indicate that the application of management models in the TED learning design on community mathematics can build critical learning patterns and higher-order thinking learning processes through the exploration stage, as well as build democratic interactions between students and between students and parents, which ultimately strengthen community support for school administration.

Conclusion

Thematic-explorive-democratic learning outcomes (TED) about community mathematics can provide students with learning experiences outside the classroom and improve the ability to explore objects or contexts and integrate them with the concept of learning mathematics for junior high school education. Planning in the learning management component that describes the material in the activity design can provide directions for implementing the learning design. Organizing, namely the activity of organizing materials and resources for community mathematical knowledge in the process of field activities to integrate existing resources with the goals to be achieved. The implementation of field activities can support the interaction process of group learning interactions consisting of students - parents and the community to build democratic attitudes and more open communication within groups, between study groups and in general between children and children and between children and parents. The interactive role management model of the thematic-explorative-democratic learning component in integrating objects with mathematical concepts and procedures, improving individual abilities and democratic interactions in learning groups.

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